

# HOW TO DIAGNOSE SMALLPOX

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# HOW TO DIAGNOSE SMALLPOX



# HOW TO DIAGNOSE SMALLPOX

A GUIDE FOR GENERAL PRACTITIONERS  
POST-GRADUATE STUDENTS  
AND OTHERS

BY

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THE METROPOLITAN ASYLUMS BOARD

WITH ILLUSTRATIONS



PAUL B. HOEBER

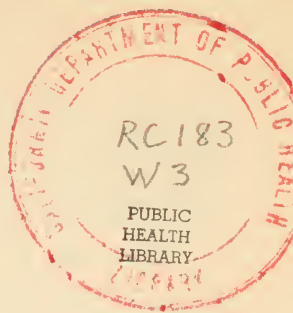
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## PREFACE

DELAY in the recognition of smallpox is an important factor in its spread. To contribute to its earlier recognition is the object of this book.

It treats of the diagnosis of smallpox as a matter vital to the control of the disease, and sets out the principal diagnostic points in handy form, so as to be readily available in practice. Drafted eight or nine years ago, in the form of notes for post-graduate demonstrations or lectures, it is intended primarily as a guide for those who are in general practice; others, however, who have to deal with smallpox, may also find it useful.

Its subject matter is briefly as follows: the effect of unrecognised cases in spreading smallpox; methods of clinical examination; a description of typical cases of smallpox, with special reference to the arrangement of the rash upon the skin; an explanation of the principle underlying that arrangement; other diagnostic

features of smallpox; the initial rashes; the differential diagnosis of chickenpox, measles, and other exanthems.

The aim of the book is to warn the diagnostician of the difficulties and traps which he is likely to meet; how to avoid them; to assist him not merely to a rough proficiency, but to a high degree of accuracy in diagnosis. It is the author's belief that the data for a correct diagnosis are present and available in nearly every case of smallpox; and that accuracy in their interpretation may be attained, with even a moderate amount of practice, if due attention be given to the methods here indicated.

The book is based upon an acquaintance with smallpox extending over 20 years, and including the reception of the cases in the epidemic of 1901 and 1902, during which years it fell to the writer to receive from London about 10,000 cases certified as smallpox, and to revise their original diagnoses.

I am glad of this opportunity of acknowledging my indebtedness to my former teacher and colleague, Dr. T. F. Ricketts; especially as an earlier contribution escaped me, to my regret,

without such acknowledgment. That contribution, and these pages, are little more than attempts to set out his teaching as it has been put into practice by myself.

My thanks are also given to those who have helped me in the preparation of this book; especially to my former colleague, Dr. A. F. Cameron.

LONDON,

*May*, 1913.



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# HOW TO DIAGNOSE SMALLPOX

## CHAPTER I

### THE SPREAD OF SMALLPOX BY UNRECOGNISED CASES

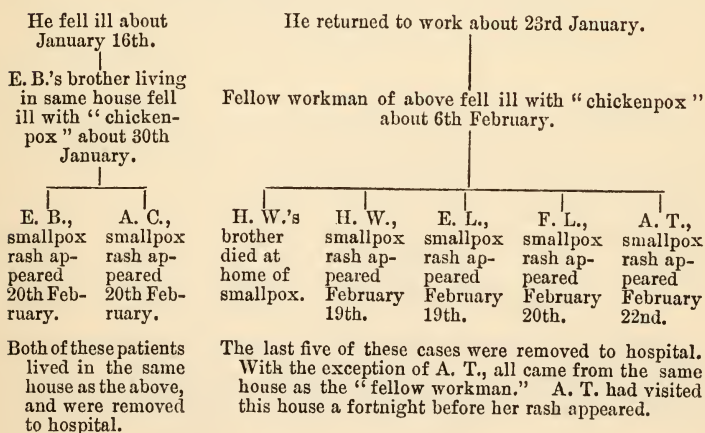
It is essential to realise the mischief which may be done by unrecognised cases of smallpox. There is hardly any disease of which the prompt recognition is more important to the general community. Almost every outbreak in London in recent years has been started, or propagated and prolonged, by unrecognised cases. Epidemics teem with examples, which only cease to be recorded because they become trite. For instance, in 1888, Dr. Birdwood, then Medical Superintendent of the Smallpox Hospitals of the Metropolitan Asylums Board, reported: "The other lesson seems to be that greater care should be taken in distinguishing mild attacks of smallpox from

chickenpox. It so frequently happens that the bedfellow of a confluent smallpox patient had previously a few spots that had been mistaken for chickenpox. There is only one way of putting this right—the medical profession should have opportunities for clinical observation placed at their disposal; your hospitals alone are available for that purpose, I see no difficulties in the way of admitting students to the practice of this hospital. They ought to be admitted in the interests of the public health.” Of the year 1892, Dr. Ricketts, who succeeded Dr. Birdwood, wrote, “Early in March, smallpox broke out in a crowded locality in Shoreditch. The source of infection in this instance was a child who fell ill about 7th February, her complaint being diagnosed as chickenpox. It is not known how she contracted the disease, but it spread from her to other inmates of the same house, and thence rapidly to the surrounding population.” Of the epidemic of 1893, Dr. Long, one of the medical officers engaged, reported that thirty-one persons attributed their attacks of smallpox to twenty-eight cases of “chickenpox.” “Two of the local outbreaks,” he proceeds, “are to be ascribed to ‘chickenpox.’”

Thirty-four persons ascribed their attacks to at least thirty-four cases of 'spots'; fourteen others to various complaints, such as measles complicated or not with spots, or chickenpox, influenza with or without spots, German measles, or some slight ailment. Some of these diagnoses were made by chemists and other irresponsible persons."

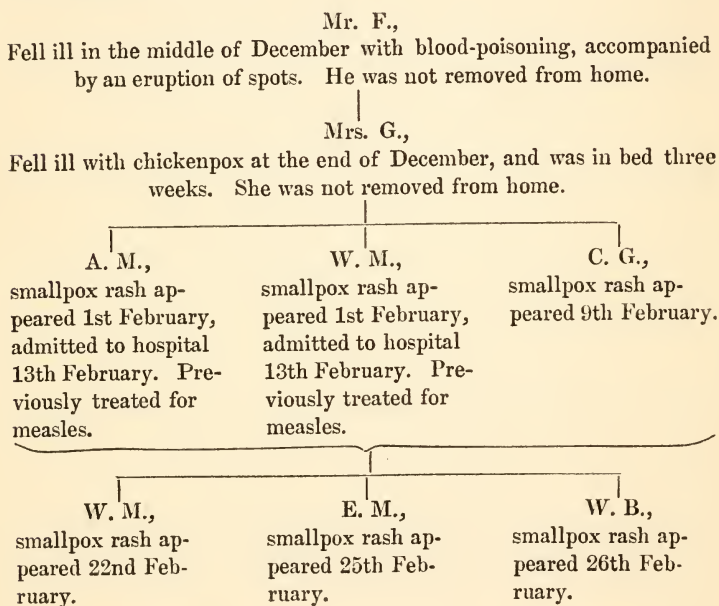
In his report for the year 1894, Dr. Ricketts quoted this case—

"A young man had influenza 'with spots.'"



Again: "Of the six patients mentioned (another group in the same year, 1894), two had been ill with smallpox for close on a fortnight before admission, and had been previously treated

for measles. Another person in the house had been ill, and treated for three weeks for chickenpox, while the fourth had an illness accompanied by an eruption which was supposed to be due to blood-poisoning. Supposing, as is probable, these persons really suffered from smallpox, the group of cases in this house may be tabulated as follows:—



Such instances as the foregoing could be multiplied to fill a volume. I will give two further examples. That which relates to the year 1900 is a very remarkable series of cases, but

led, however, to no great outbreak. There were sixty-four cases of smallpox altogether in this year.

Dr. Ricketts reported: "A group of cases occurred in Hackney in January and February, 1900, which was traced to a gathering of friends in a small house in Homerton, on Christmas Day, 1899. It was found afterwards that a boy then present was suffering from a mild attack of smallpox. His illness had been mistaken for chickenpox. Eight persons present on that occasion afterwards fell ill of smallpox, and seventeen persons in all owed their illness to the same source.

"On March 29th, the s.s. *Caledonia* arrived in the port of London. The steward and the ship's clerk returned to their homes in St. Pancras and St. Marylebone, and fell ill of smallpox within a few days of one another. Five persons with whom they came in contact afterwards developed the disease.

On May 21st, a woman was admitted here with smallpox, who was the widow of a valet employed in Victoria Street, Westminster. Her husband had just died, it was supposed of measles; but

there can be little doubt that the nature of the disease was hæmorrhagic smallpox. The origin of his illness was for long obscure, but it appeared probable that he caught smallpox at an eating-house in the north of London from one of the cases originating in the *Caledonia*. Thus, while the outbreak was stamped out in the north, its focus shifted to the south-west of London. Three persons with whom the valet's wife came into contact caught smallpox and were sent here; while about the same time, a woman who lived in the same house in Victoria Street, and had come in contact with her or her husband, was admitted as a patient to a general hospital, and died there of a severe attack of confluent smallpox. The nature of this patient's illness was unrecognised, and five other persons who were patients or employed at that hospital, caught smallpox from her, and were sent here. When the valet died in Victoria Street, some linen from the house was sent to a laundry at Chiswick, and another centre for the spread of the contagion was thus furnished. Again the earlier cases were unrecognised, and nine patients were admitted in consequence. Nor was this



quite all, for when the valet died, his brother came to London, and took the smallpox back with him to the provincial town where he dwelt. Four or five cases of smallpox resulted.

“So far as is known, at least thirty cases in London and out of it could thus be traced back to the *Caledonia*, and over twenty cases to the man who died of ‘measles’ in Victoria Street. This is a somewhat unusual experience nowadays, and it is to be explained by the repeated mistakes in diagnosis which were made. Thus the nature of the original cases from the *Caledonia* was not at first recognised. The man in Victoria Street was supposed to have measles; the patient taken to a general hospital died of a rare skin disease, the name of which has escaped me; while the earlier cases in Kensington and those in the provincial town were classed as chickenpox.

“Early in April, there was a small outbreak of smallpox in St. George’s-in-the-East. Five patients were sent here from that infirmary, and two more from the same part of London, who all appeared to owe their illness to a common source. The first to fall ill was a boy, who was treated in the infirmary for chickenpox, the true nature of

whose illness was not perceived until other secondary cases had occurred.

“The cases so far touched on form the bulk of the admissions for the year, but it may be worth while to allude to the remaining cases.

“In February, a young woman was admitted from Greenwich. She was shortly to have been married, but she died here of hæmorrhagic smallpox. She caught smallpox from her mother, in whom the disease was of a similar nature, and had a similar result. How the mother got smallpox is unknown, nor was the nature of her illness recognised; she was stated to have died of blood-poisoning.

“Three persons, members of the same family, were admitted from Streatham, in August. The father of two of the patients had died shortly before their admission. His illness was supposed to have been due to measles. He seems to have caught smallpox from a son, who had come home on leave from a training ship at Devonport. The son was said to have chickenpox.

“In November, two fellow servants were admitted from a house in Sloane Gardens. One of them has barely escaped with her life. It



seems probable that they got smallpox from their master. They told me he had been suffering from blood-poisoning with an eruption of spots.

“It has been mentioned that two patients were admitted from Orsett, in Essex (in July). The first patient was a youth in the Navy, who had returned to Orsett on leave from one of H.M. hospital ships. He said there was a boy there who had been suffering from German measles and chickenpox, a double-barrelled diagnosis, very suggestive of smallpox. The second patient admitted caught smallpox from the first, and died here.

“I think it may be said justly that the most part of the cases of smallpox which occurred in London last year, might have been prevented very readily. Had the mistakes in diagnosis which I have recounted not been made, so much illness, much suffering, and some deaths would have been avoided. Smallpox is a disease which in practice seems to present more difficulties in its detection than do most others; it is the disease in which mistakes are of most moment; and yet it is, perhaps, of all diseases, that in which a certain diagnosis can be arrived at in almost every case.”

## CHAPTER II

### UNRECOGNISED CASES AND THEIR REMEDY

IN the next year, 1901, to which the following extract relates, though mis-diagnoses do not stand out so prominently, the results were more disastrous. They formed the beginning of an epidemic comprising nearly 10,000 cases.

Dr. Ricketts reported :

“The seeds of the present epidemic were sown in June (1901). The two first patients admitted in that month lived in Whitechapel and East Ham respectively. In neither case could the origin of the disease be traced, nor, so far as is known, did other cases develop from them. Two more important foci of infection appeared at the end of June : (1) A man who had visited Paris returned to his home in Streatham and developed

smallpox there; he died, but the nature of his illness was not appreciated. A relative of his caught smallpox from him and was admitted here; his linen was sent to a laundry to be washed, and two persons working in that laundry also got smallpox. (2) A laundry carman working in Hackney caught smallpox, doubtless from the linen of one of the customers of the laundry; a laundrymaid also caught the disease from the same source; from this source nine others contracted the disease in July and August.

“Two more centres were noted in the month of July. The first of these was a house in Norfolk Square, Paddington, the housekeeper and a domestic servant employed at the house falling victims, as well as a gentleman who was in the habit of visiting there; the origin of the disease in this case could not be ascertained. The second centre was in Willesden, and the disease in this case appears to have been spread by means of infected bedding, which was sent to Willesden to be disinfected or cleaned. I do not know whence this bedding came, but three persons caught smallpox directly or indirectly from this source.

“This carries us up to the end of July and the beginning of August, when a few cases occurred in the west of London—cases which were apparently unconnected, but which probably came from a common source and were the forerunners of a serious outbreak. The first of these was a case of a woman of French nationality, who lived in the City of Westminster. At the same time occurred the cases of two sisters who lived in Marylebone; a sister of these patients was stated to have had chickenpox, but, assuming her illness to have been smallpox, its origin was unknown. A fourth case was that of a German waiter at the Langham Hotel. On August 9th, a patient was admitted who lived in Huntley Street, Tottenham Court Road; a few days afterwards two patients were admitted from Holborn, another from St. Pancras. In none of these cases could the source of infection be traced, and, generally speaking, the cases seemed to be unconnected. But the common factor was that their places of residence, their avocations or amusements, took them into that part of London about the Tottenham Court Road, and it was in that neighbourhood, in

some crowded streets lying on the west side of Tottenham Court Road, that smallpox broke out in the latter half of August, and shortly assumed an epidemic form. Between the 19th and 31st August, sixty-eight patients were admitted, of whom all but eight either resided in the district I have mentioned or appeared to have caught the disease there. In September the disease continued to spread to all parts of London. Its prevalence in its original seat continued up to the end of the year, so that of the total number of cases which occurred in London during the year, one-third were removed from St. Pancras, Holborn and Bloomsbury. But there was not a single union which escaped the visitation.

“From what has been said it will be seen that, once it had obtained a foothold, the epidemic developed with great rapidity. Thus on August 19th, there were only fifteen patients under treatment in this hospital. In eight days this number increased to seventy-three. In a little over two months the hospital was full and patients were being transferred to Gore Farm, and in four months patients were being admitted at a rate of upwards of thirty a day. This course



of events illustrated once more the fact that outbreaks of smallpox are prone to occur without warning, and to reach unpleasant proportions with great rapidity; and it emphasises the need for being always prepared to deal with an emergency."

These and similar reports show how easy it is for smallpox to creep in, establish and propagate itself, undetected. Prompt recognition of the disease is seen to be vital to effective control.

That, however, is by no means a simple matter. Smallpox diagnosis is a subject attended by circumstances which are altogether exceptional. Not only is the opportunity of studying smallpox very limited, and the profession much handicapped thereby, but the disease itself presents greater difficulties of diagnosis than do most diseases. The early symptoms are common to many other disorders; variations from type are numerous and wide; the various stages of the disease present remarkable differences. The consequence is that smallpox has a power of deception which is as subtle as it is formidable.

In considering what can be done to meet this, it may be said that the diagnosis of smallpox is in the hands of a few ; that they cannot impart their knowledge, and that missed cases cannot be helped. I do not take that view. On p. 9, Dr. Ricketts has been quoted as writing of smallpox, "It is, perhaps, of all diseases, that in which a certain diagnosis can be arrived at in almost every case." Considering the difficulties which cases present, and the differences of opinion which they are apt to occasion among us, that is a remarkable statement and might well be challenged. But it agrees with my own experience, and I believe it to be true.

I take the explanation to be this. Accurate diagnosis of disease results from the correct reading of accessible pathological data. In some diseases, as for instance in acute lobar pneumonia, these data are easily perceptible ; in others, such as in meningitis, they exist none the less, but are not readily accessible. The pathological data of smallpox, however, are mainly on the surface. It may be said of smallpox that, with very few exceptions, throughout its course it carries with it the naked-eye pathological evidence. The

difficulty is to read this evidence aright. Rashes resemble hieroglyphics. Though the writing is all there, it is not always easy to read.

Of course there is nothing like practical work for learning the subject; experience shows, nevertheless, that a great deal of useful information can be imparted in the study, and will be invaluable at the bedside, as opportunities of practice occur. Sound practical knowledge can be gathered from the written page even when actual smallpox cannot be seen. If anyone, who is anxious to improve his knowledge of the subject, studies what is given here, he can learn a great deal that will stand him in good stead when he meets with actual cases in practice.

To illustrate this, reference may be made to the reports of the Metropolitan Asylums Board in reference to smallpox diagnosis. Formerly, the smallpox hospitals were in London itself, and patients were admitted to them direct. The hospitals were moved out of London on account of smallpox occurring in their neighbourhoods. Patients then were sent to be treated in hospital ships, first at Greenwich, and then near Dartford; now the ships have been taken away, and



the hospitals are on shore. At the present time patients are taken by a land ambulance from home to a riverside wharf, usually South Wharf at Rotherhithe, and sheltered there till the ambulance steamer takes them down the Thames to the shore hospital near Dartford.

Formerly many of the patients directly admitted were found not to have smallpox, and some method of revising the original diagnosis was necessary before actual admission to hospital. In the year 1892, a temporary medical officer was stationed at South Wharf, Rotherhithe. In 1893 a medical officer was appointed to reside there, and, in the course of that year, shelters were erected in which, if necessary, patients could be detained and kept under observation. It was the duty of this officer to revise the original diagnoses, and to reduce to a minimum the admission to hospital of non-smallpox cases. In 1893, of 2433 patients sent on to hospital for admission, 73 turned out not to have smallpox, that is about 3 per cent. passed the diagnostic screen and were admitted. The next epidemic year was 1901. Of 1603 patients sent on to hospital for admission, 8 turned out not to have smallpox, that is 0·5 per cent. In the

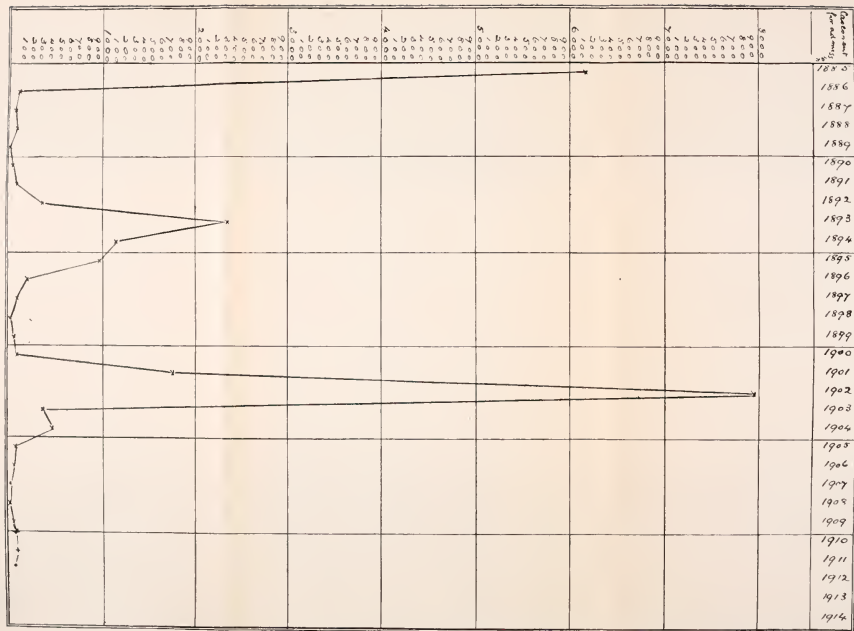
following year, 1902, of 7208 patients sent on to hospital for admission, those who turned out not to have smallpox were 3 in number, that is 0·025 per cent.

Various factors combined to produce this improvement in results, among them being the provision of certain administrative facilities; but the main factor was the method of diagnosis worked out by Dr. Ricketts, and taught by him to his colleagues. It is this method of diagnosis which I desire to set out.

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Prevalence of smallpox in London between 1885 and 1912. The curve shows the cases sent for admission to the smallpox hospitals.

## CHAPTER III

### PRACTICAL POINTS IN THE METHOD OF EXAMINATION

IN this chapter I propose to deal with some of the points which, apart from the disease itself, are very important if accuracy in diagnosis is to be attained. The first is this. The commonest cause of smallpox being missed is that its possibility has never come into the mind of the medical attendant. How often has it been said, "Smallpox! Why, I never dreamt of smallpox! It never came into my head. There was none about, and I confess it never occurred to me." But once the possibility of the disease comes to mind, once the question is put to oneself, the whole case may be cleared up. There is no more useful habit than that of reflecting, when confronted by a case, the diagnosis of which is not perfectly clear, "What else can this be? Can it be this, that, or so on?" And of all such questions, there is none more

important than this one, "Can it be smallpox? Would smallpox produce this?" Such a question should not only be in mind when smallpox is prevalent, but also when it is not epidemic; for it is precisely at such a time that cases are most easily missed, and are apt to do the worst mischief.

Coming now to the examination of suspected cases, we find that there are three details of technique which especially claim attention. They concern the manner in which cases are examined. Their neglect has led to many wrong diagnoses. The first detail is to have a due respect for the subtleties of smallpox. The want of this is a common source of error. It is apt to be said, "I have seen plenty of smallpox, and have studied cases most carefully. I know it well. I don't think I could go wrong." That is a fatal attitude of mind, and certain to lead to disaster. Persons of that way of thinking have yet to buy their experience, and will pay for it very dearly.

To diagnose smallpox successfully, means to approach it with much respect. That is a *sine qua non*. The more of it one sees, the more respectful one gets, and the more on the lookout

for the extraordinary cases that do occur. The closest attention must be given to every individual case, if the best results are to be obtained.

Our next point is a commonplace but important detail. Before giving an opinion, it is essential to see the whole surface of the body, and as much as possible in one view. The full bearing of this will be better understood when we come to Chapters IV and VI, and see how frequently a correct opinion turns on a comparison of one area of the skin with another. Bed is the proper place in which to examine a patient; for then the patient and his coverings may be so disposed as to obtain the maximum results with the minimum of time and inconvenience.

A bath may work wonders in displaying a rash which previously was invisible. No opinion in the negative sense should ever be given about a patient whose skin is dirty, till he has had a good wash. Late cases of smallpox, see p. 99, may have no other reliable evidence about them than that on the soles of the feet. A girl, whom I saw recently, had had an illness some three weeks previously. Her skin was clear, except



for some slight blemishes, which were suspicious. A glance at the soles of the feet, which had just been washed and were clean, clinched the diagnosis of smallpox.

The last point is the necessity for a good light. The absence of this precaution has accounted for many missed diagnoses. Anyone who has had to see a succession of cases first by very dim illumination, and later by an adequate light, will appreciate how enormously a bad light adds to the difficulties of the work. It is one of the special difficulties of seeing cases in poor homes, and may make an opinion almost impossible to give. Such a case happened to me recently. I went into a little room, a cube of 10 feet with a big double bed in it, and found a lad and a girl sitting by the fire. It was still daylight, and the room could hardly be called dark, but it was badly lit. I could see the girl well enough to recognise her easily, if I had known her; she did not seem ill, only rather quiet and dull. I looked at her hands and face, and could see nothing amiss. Dissatisfied, however, I took her into the backyard, where the light was fairly good. It was nearly four o'clock on a February afternoon. At once there



was visible on face, hands and wrists the early papular rash of smallpox, many of the spots being no more conspicuous than the rose spots of typhoid fever.

In a properly equipped receiving room, conditions exist which greatly facilitate diagnosis. The patient lies at full length, after a bath if necessary, in a blanket gown, at a convenient height, and under an ample daylight or bright artificial light. Such conditions are a great help. But in such conditions as exist in many poor homes, when you are asked for an opinion on a patient who refuses to undress, has a dirty skin, or is placed in a dim or flickering light, you should withhold your opinion, unless the case is perfectly clear.

Such details of examination, as I have mentioned, may be of direct importance to the physician as well as to the patient. An error of diagnosis occasionally brings the medical attendant into court to answer charges of negligence or malpraxis, brought by an aggrieved patient who is claiming compensation.

I have heard such an action tried in the High Court. A medical practitioner saw a child in

his private practice, and thought she had smallpox; so also did the Medical Officer of Health who saw the case in consultation with him. They both certified. There was good reason. The rash was copious, and bore a close resemblance to that of smallpox. In the sequel, however, the diagnosis of chickenpox was established beyond all doubt; the child's mother was very angry, and brought an action to obtain compensation for the damage which had been caused to her business. Fortunately counsel for the defendant was able to show that his client's opinion was arrived at after the exercise of all the care and skill which he could bring to bear. He had seen the child twice within a few hours; had got the best light he possibly could, had taken all the clothes off, and examined the whole surface of the skin thoroughly. Feeling the limitations of his own experience, he had called in another opinion. When the jury heard all this, and were satisfied that the defendant had taken every possible care and trouble, and had brought all his ability and skill to bear on the case, they intimated that they had heard enough and gave him their verdict. But had he made an examination of the patient, which

was cursory or careless, or had he shown a lack of due and reasonable care, then the issue might have been very different. Certainly both judge and jury paid particular attention to the degree of detail and care with which the case had been examined. That seemed to weigh with them more than anything.

## CHAPTER IV

### INDIVIDUAL CASES OF SMALLPOX CONSIDERED WITH A VIEW TO DIAGNOSIS

IN considering the clinical details which influence diagnosis, it is advantageous to take one or more individual cases. Once the points are clearly grasped, it is not difficult to apply them to other patients who may subsequently be seen.

For the sake of clearness the various points are set out in the form of question and answer.

“Have a good look at the photos of these coloured people; see plates Nos. 1, 2, 3, 4; a correct diagnosis can readily be made from them. Disregard, for the moment, the anatomical characters of the individual spots; regard the rash as so many dots; and examine just how they are arranged. That is the point on which we have now to concentrate our attention. It is a useful practice, and takes only a few minutes,

to dot down the spots of an actual case roughly on a diagram and see how they lie. First of all where is the rash scantiest in these four cases? Where is the skin most clear of spots?"

"On the front of the child's trunk, on the chest and belly."

"Yes. The spots there number not more than ten or a dozen, and the area of skin which they occupy is large, relatively speaking. Note this then, that while the rest of the skin is materially affected, the chest is lightly covered, and the abdomen shows an almost clear sheet of unblemished skin. That is very striking; and is a point not to be forgotten. So much for where the rash is lightest. Now, where is it most marked, leaving, for the moment, the legs out of account?"

"It seems thickest on the face."

"That is so; it is noticeable especially on the woman's face."

"What about the arms?"

"The rash on the woman's arms is not so thick as that on the face, and yet thicker than that on the back."

"And on the back?"

“There it is thicker than on the chest.”

“Quite so. We have now got some of the salient features of the distribution of the rash, namely, that abdomen, chest, back, arms, face are in ascending order of density.”

“The principle underlying this simple observation is one of much importance, and very valuable in diagnosis; we will proceed further to illustrate it. As you look at the rash, which you see affects every part of the surface, and you know is smallpox, would it strike you as odd if a patient showed exactly such a rash, with this exception, that one arm from the shoulder downwards had no rash at all, and was perfectly free from any blemish? Would that seem remarkable?”

“I think it would.”

“Can you conceive it could be compatible with smallpox?”

“Hardly.”

“Quite so. It is not compatible. Neither is it possible to have such a rash with both arms or with the back clear, or to have such a rash on the face and the rest of the skin clear, or for the face to be clear, and such a rash to be on the rest of the body, and for any such cases to



be due to smallpox. This fact has an important bearing on many suspected cases, as we shall see later. It is especially useful to get a clear impression of the various areas of clear skin, and of pock-marked skin, and to have an indelible mental picture of them. You will find it very useful.

“Now we will leave the lower part of the body and the minutiae of the upper part for later consideration, and go to some other matters.

“Supposing this man walked into your surgery in his ordinary costume and you suspected smallpox, and you yourself had to form an opinion about him—an opinion which you had to record there and then in writing, and had to act upon and to stand by, how would you go to work?”

“I think I should ask him when he fell ill, and if he had had any vomiting, or pain in the back.”

“Yes, you would first of all take the history. So would ninety-nine people out of a hundred. It is the way we are all taught; but it is not the plan which leads to the best results. I prefer to follow the plan of leaving the history to the last. It seems to me that, if the man is accused of

smallpox, so to speak, and you are to judge and sentence him, the evidence which ought to weigh most with you is your own direct observation, and the reading of what is before you. The evidence which, other things being equal, will make most impression in your mind is that which gets there first; and if the evidence which you first take into consideration is hearsay evidence, and some of it mere gossip, you have to bring the most valuable evidence of all, namely that proceeding from your own observation, to a mind already prejudiced; and it will not weigh as fairly with you as if it came to a mind absolutely open. What is commonly called history, when taken first, must always produce a bias, consciously or unconsciously. I would rather be altogether without it, till all the other evidence has been taken.

“Moreover the history often is, and indeed in the nature of things must be, unreliable; for it is often but hearsay evidence of the slightest kind. It is easy for a patient to misreport it, to forget what is material, and exaggerate or underrate what is important. There may be every temptation to minimise his illness or deny it altogether. There may be the strongest inducement to conceal



or to misrepresent it. In the case of a foreigner, or a child, or some one very ill who cannot be cross-questioned or understood, you cannot get at the facts of the history at all, try as you may; you may waste much time and in the end have to give it up.

“But, apart from these considerations, let us suppose that the history which you have got is a correct statement of what has happened. What is it likely to be?”

“The patient might say that he felt queer and sick on, say, a Sunday morning; his head was bad, his back and limbs ached and he was weak in the knees; he was miserable and good for nothing; he got no better as the day went on; he tried to take his tea but was sick after it; he shivered, went to bed early with headache; felt very hot, slept badly and dreamt much. On Monday was sick again; couldn't eat anything, had aches and pains all over, especially in the back; and felt very miserable. Got up and sat over the fire shivering, and had soon to go to bed again. On Tuesday felt a shade better. That day he noticed some red spots on his forehead and wrists. The next day, Wednesday, they were all

over his face, and on his arms and hands and elsewhere ; and he felt decidedly better.”

“That sounds a useful history, and one which throws considerable light on the diagnosis. But might it not be the history of a case of chicken-pox? What do you say, for instance, to these notes of a case which came under my observation on the 4th day?

“ ‘ A.B., male, aged 20 ; medical student.

“ ‘ *Day 1.* Taken ill acutely with fever. Temperature  $102^{\circ}$  ; malaise ; shivering and general aching.

“ ‘ *Day 2.* Pyrexia continued ; malaise ; patient unfit for any work.

“ ‘ *Day 3.* General improvement ; papules noticed on chin in evening.’

“Would not this history strongly incline you to smallpox ? ”

“I think it would.”

“Well, if you rely much upon histories, you would have good reason. Chicken pox in adults often takes a severe form ; the initial illness may be alarming, and differ but little from that of smallpox. There is no definite mention of prostration in this latter history, though my recollection is that it had been present. One difference between it and yours is that this contains no note of vomiting. The occurrence of vomiting in a history of that kind is in favour of smallpox ; but the

absence of vomiting from the history does not negative that disease. In point of fact, my note on A. B. goes on thus :—

“ ‘ Day 4. Patient had been certified to have smallpox ; upon which certificate he is sent to-day to the Receiving Station for admission ; an abundant eruption is present. The diagnosis is not confirmed, and the patient is found to have chickenpox.’ ”

“ So that even in this case, where your history is an accurate account of what has passed, it is apt to lead you astray. That is what experience shows again and again. And commonly histories are not correct ; they have to be treated with great discrimination. Reliance on them is one of the commonest sources of error. At the Receiving Station it became a matter of routine to take the histories last in the examination. Often we had to do without them, because patients were too confused or ill to make any statement.”

It is necessary here to add one or two provisos. I do not wish to underrate the value of a story that may have come to your knowledge indicating a suspicion of smallpox in some one whom you have not seen. You may hear that so-and-so has “the influenza with spots,” or “chickenpox and German measles,” or “blood-poisoning and

spots." Such a story should be promptly followed up. It raises a strong suspicion. It makes a *primâ facie* case, and requires further investigation. But once an individual patient comes under examination, avoid letting him or anyone speak to you about the history of the case, until you have completed your own examination.

My advice is to try first to read the open book before you; the writing is all there. I mean, of course, the rash as displayed on the skin. To be groping about for a history is to lean upon rotten supports which you are better without. Sir George Murray Humphry used to say, of examining cases in general, "Eyes first. Hands next. Tongue last and least."

If such a patient as we have supposed should walk into your surgery and you should suspect smallpox, and you want to form a correct opinion in the minimum of time, the best way is to cut conversation short, have the skin as far as the waist uncovered, with a suitable loose wrap if necessary, and to place the patient in the best possible light, the forearms being crossed in front of the chest. Let the eruption then speak for itself.

I should like here to mention a useful practical

method in examination which has already been alluded to on p. 27. It is always helpful, and especially so when a case is not clear. At the Receiving Station I endeavoured to make a practice of plotting out the rash of every non-smallpox case, on one of those red diagrams of the figure which are sold by the medical booksellers. I also made a written note of the case, according to a short series of case headings. It was a most useful practice, which I recommend strongly to anyone similarly placed. Incidentally, it was evidence of care having been exercised, and was useful subsequently, if a question was raised about the correctness of the diagnosis.

The act of dotting in the rash compels close observation of its distribution, and often of itself leads to a correct solution. We shall see presently that a diagnosis of smallpox can sometimes be made, after all the scabs have gone, by noting the situations of the scars or stains which have been left on the skin by the rash. Make a diagram therefore, no matter how rough, of any case that is not perfectly straightforward. You will be surprised how much it may help you. It may by itself clear up a case that has puzzled you very much.



## CHAPTER V

INDIVIDUAL CASES. OTHER FEATURES OF THE RASH

“LET us now resume our consideration of details of the rash. Having decided to postpone taking the history, what point about the case would you care to take next?”

“I should examine the spots closely, and see if they had the characteristic appearances of the rash of smallpox.”

“Such as what?”

“Well, to see if the spots were umbilicated or shotty.”

“Yes, of course; that is what we have all been taught, that the hall marks of smallpox are umbilication and shottiness. It is a characterisation absolutely wide of the mark for purposes of diagnosis. The words are uncommon, and easy to remember; they are a pair of favourite old friends which impressed us as students, and

have stuck by us from our medical youth upwards. It is only when we come to test them in the diagnosis of smallpox that we see what an unreliable pair they are; they are hardly of any use at all. Are you going to say that the absence of umbilication excludes smallpox?"

"I should hardly say that."

"No; the absence of umbilication is a point of almost no importance as against smallpox. Let us consider for a moment what umbilication means. As the pock passes from papule to vesicle, there is a flattening or positive dimpling of its top. It depends on this. Inflammatory serum is exuded between the epithelial cells and collects among them, the tension thus exerted being what gives firmness to the papule; soon the tissues yield to the fluid pressure, the epithelial strands give way, the fluid collects into a bead, and a vesicle is formed; the unsupported part of its envelope, namely, that towards the surface of the skin, yields and thins; but complete and regular spherical expansion is retarded by the strands of epithelial cells among which the fluid has collected, and they tie together the roof and floor of the vesicle. Thus the roof may be flattened or dimpled. That



is your umbilication. Soon these internal ties soften, as pustulation advances ; they disappear altogether, and then the pock assumes the familiar dome-topped form. Hence, at best, umbilication can only be a transitory phenomenon lasting for a day or two ; for the rest of the time umbilication must be absent.

“ Moreover, in some cases, and those among the most severe and infectious, umbilication may never be present from beginning to end. In some of the worst cases the invading poison seems overwhelming ; no vigorous reaction of the tissues takes place ; the vesicles are but feebly expanded, and little or no umbilication is possible. On the other hand, a chickenpox rash is not infrequently marked by umbilication. A spurious kind of dimpling is not at all uncommon, from the vesicles becoming broken and their walls falling in ; and occasionally a true umbilication is seen even in chickenpox. In a word umbilication is a weak reed to lean on ; the sign is very inconstant ; it is often absent from well-marked smallpox ; when it is present, the diagnosis is usually clear without it ; as a diagnostic criterion it is almost without value.

“Then you have spoken of shottiness. How often that sign has led to cases being sent as smallpox that really were not! Repeatedly I have heard it said, ‘Well, I found the rash was shotty and I didn’t care to hesitate any longer.’ It is certainly wise to err on the right side; but what we are here considering is how to get accurate results both ways.

“By shottiness is usually meant that a papule feels firm and hard in the skin, when it is felt against a bone, as for example the frontal bone. At that rate acne is shotty, chickenpox in the adult is almost always shotty; so are many other skin eruptions. I recall several cases of mosquito bites, for instance, in which the spots were as hard and ‘shotty’ as anything could be. How is this sign going to help you in the differential diagnosis? Moreover, shottiness, even if it were of any help, is only available during the papular stage, and during no other stage of the rash.

“It is perfectly true that at that stage the pock is usually a tense sphere lying deep in the skin. Dr. Ricketts advises that the right way to estimate the depth of a lesion is to pick up

a loose fold of the skin and roll it backwards and forwards between the finger and thumb. A good idea of the depth of the pock can thus be formed. But that is not what is meant by shottiness as the term is commonly used; what is usually meant is the hard feeling of a spot when pressed by the finger against a bone. It is said that when this sign is found, smallpox may be strongly suspected, or definitely diagnosed. When the sign is not found, it is said smallpox can be excluded. As a matter of fact, there could not be a greater mistake than this last observation. What would you say to this question? Is it possible for a severe attack of smallpox to occur in which throughout the papular and vesicular stage the rash is not firm or hard at all?"

"I don't see how it could fail to be firm and hard at some time during the papular or vesicular stage."

"That idea is incorrect; and it is material to emphasize the point because it may easily lead to a severe case of smallpox being missed. It is precisely the worst class of smallpox, of the most infectious type, that is apt to have a soft, almost

velvety papular rash. Let me give you a case in point. D. L. was a little boy certified to have smallpox. On his forehead and face he had a well-marked papular rash which was as soft and velvety as any rash could be. It resembled closely the rash of morbilli, but was complicated by a pre-existing scaly condition of the skin, of some standing. There was no shottiness at all about the papular rash. The patient was bright and talkative, and played with his toys. On the day following, the general condition and the appearance of the rash was much the same. The next day saw a great change. The child was obviously ill, and much of the rash was marked by low flat vesicles. He had, in point of fact, an attack of smallpox of almost the worst type."

It is especially in the worst type of case that you expect to find a low, soft rash, in cases in which the potency of the poison appears completely to overpower the healthy working of the tissues, and but a feeble reaction takes place. The spots, instead of being centres of strong reaction and inflammation, are dull, flat, soft and delayed in maturation. Such a rash is especially apt to be associated with a severe and

confluent, or with a hæmorrhagic attack, and with a low range of fever. In this connection, I would give a word of warning about the class of case, very severe confluent, in which the face is, as it were, covered by one huge papule, which slowly raises the skin in one sheet. The lesion in such cases is apt to be completely overlooked by the untrained eye; and that is not surprising; for the face may appear to have nothing the matter with it, till it is closely inspected; then the features may be noticed to be only a trifle full, or a little bloated; and the discovery is made that the patient is suffering from a type of the disease which is absolutely fatal.

While we are on this part of our subject, there is one more sign that may be mentioned and dismissed, and that is, loculation. The smallpox vesicle is said to be multilocular, and the chickenpox vesicle to be unilocular. That is often the case; but I have found the point to be of little assistance in practice. And it is not always the case. I recall three young children, members of the same family, unvaccinated, in whom the rash on the first and second day looked as though the skin had been touched in a number of places by



a hot substance of the thickness of the top of an ordinary cedarwood penholder. The skin was marked by what looked like a number of superficial burns. The rash, especially in one of the children, had just the appearance of chickenpox. The pocks themselves were strictly unilocular; if one was pinched, it collapsed on slight pressure, without any pain to the patient, and left an irregular pellicle, lying flat and collapsed. But the rash of all these patients developed in unmistakable fashion, and they went through mild but definite attacks of smallpox.

You may say, perhaps, after reading this, that it seems as if all the old ground was being taken from under your feet; that these are the very clinical characteristics on which you have learnt to rely. That may be so. I have no brief against the traditional criteria. I do not deny that they are often present. But if you ask me of what value they have been to me in the diagnosis of the cases which I have seen, I can only say, very little, if any.

## CHAPTER VI

### THE EXPLANATION OF THE DISTRIBUTION OF THE RASH

THE last chapter contained a criticism of some of the traditional features of the rash of smallpox ; not because they did not exist, but because they were exaggerated in importance ; and especially because, when it came to diagnosis, they were apt to be misleading as well as useless. These features often figure in descriptions of the disease. It would be more useful to describe it in some such words as the following :—

Smallpox is an acute fever characterised by an eruption the foci of which are situated deeply in the skin, and run an inflammatory course from papule to scab ; the eruption having, in general, a symmetrical distribution, and especially favouring sites of irritation.



“To this last-mentioned feature of smallpox, in particular, let us now turn. It is the irritated surfaces which I would especially impress on your attention.

“Referring to the photographs again, do you notice anything peculiar about the rash on the woman’s right hand?”

“There is a little patch of eruption there which looks thicker than the rest.”

“Yes, that is so; it is important; it is a little confluent cluster of pocks; and if you look again, you will see that there is another similar patch, only smaller, at the root of the little finger. On the left wrist also there is a conspicuous patch of eruption. They are no chance happenings, but are of real significance; could we have questioned the woman, she would probably have told us that it was just at those places that she had cut or scratched or burnt herself, or had had some kind of sore or irritated place before the rash came out. Next note particularly the rash on the front of the thighs and legs of the child who is standing up. Can you form any idea why the rash should be so thick there?”

“It does not seem obvious.”

“The explanation is found in the position of the other child. You will notice that as the child is held and carried, the front of the thighs and legs are rubbed against the woman’s dress ; and it is just those parts that are rubbed that form the situation most affected by the rash as seen in the child standing up. That is the kind of phenomenon you will often see in smallpox rashes. It is always important to look over the details of a rash and see, for instance, how it is arranged on the face and on the feet, and if there is any other irritated surface especially marked by the rash ; conversely, if any protected surface is especially shunned by it.

“It is in these considerations that the key lies to the understanding of how to diagnose smallpox ; I will now endeavour to explain fully the underlying principle.”

Curschmann wrote on smallpox in Von Ziemssen’s “Cyclopædia of Medicine,” p. 359, edn. 1875, as follows :—

“Portions of the skin, upon which mechanical or chemical irritation has acted, either before infection or during the stage of incubation, are usually affected in a very characteristic manner.

Even when the eruption is extremely scanty upon the remainder of the body, the pustules here are usually very abundant, and frequently even confluent.

“This behaviour of the exanthem comes most frequently under observation where, shortly before, irritating inunctions or pencillings with iodine have been made, sinapisms or drawing plasters applied, or contusions or superficial erosions have taken place. A case especially striking in this regard presented itself to me in a man who had been seriously infested with body lice before his infection. He came in with varioloid of moderate severity, and exhibited numerous scratches extending over the whole body studded with pustules, crowded thickly one upon another like pearls on a string, and partly confluent. Many of these scratches were three or four inches in length, and, at a distance, gave the patient the appearance of having been tattooed.

“It would seem easy upon these interesting facts to construct theoretical conclusions respecting the causes of the density and distribution of the variole eruption in ordinary cases, but we do not get beyond the preliminary speculation.

Further observations, however, and especially experimental research, may prove of great value in this inquiry, and perhaps clear up the principal points. I will not omit to mention that, according to my experience, the conditions of the skin in question give occasion to this peculiarity of the localisation of the pocks only when existing *before infection or in the stage of incubation*. On the contrary, when I produced such conditions of the skin experimentally, in the initial stage (by sinapisms, painting with iodine, etc.), the eruption was never thicker here than in other localities.”

This uncommon density of the eruption, mentioned by Curschmann, has been noticed by many observers, and instances may be noted in almost any collection of smallpox photographs. Among many cases that I recall—the phenomenon is one of frequent, even common, occurrence—was a rash of excessive density on the feet of a certain male patient admitted with smallpox. He had a severe attack, with a copious eruption; and the rash, I recollect, was well marked on his face; on his forearms and hands it was later, and less marked; the rest of the skin at that

stage was almost free from blemish ; but his feet showed a dense rash, particularly on the under and inner sides, and on the soles, and there it was fully vesicular. The appearance of the front of the body as a whole was very striking. The red face and hands, the pale, unblemished skin of the trunk and limbs, and then the red, inflamed feet below, marked with clear vesicles as closely set as the cells of a honeycomb. This man happened to be a War Office messenger, and was new to his work ; the feet had been chafed by his unusual exercise.

Another striking case occurred in a man who was tramping the country in hot summer weather. I think he had been haymaking. At any rate, he had been wearing his shirt open over his chest, and that part of his skin was sunburnt, dirty, sweaty and chafed. He had a mild attack of smallpox and a slight rash. But much the thickest portion of the rash was on the front of the chest, over this sunburnt surface ; the rash was thicker there than on his hands or any other part. I may say in passing, that it is in hot weather that I have found the most anomalous rashes to occur, both of smallpox and chickenpox. That



is probably due to the skin being then subjected to the combined influence of heat, perspiration, dirt, and friction.

Another remarkable case occurred during the inspection of a common lodging-house. In order to pick out any cases of smallpox that might be occurring, daily inspection of the inmates was necessary. This was done while the men were in bed. One of the inspectors was acute enough to observe that a pair of feet sticking out of the end of a bed had some spots on them. At first sight the spots were not very remarkable. On closer examination they were seen to be vesicular with slight reddish areolæ. There were about a dozen or twenty spots on the two feet together. They were the only spots the patient had about him, except for one or two inconspicuous and apparently trifling papules which he had upon his face. I had no hesitation in pronouncing the man to have smallpox. He was a hawker and constantly standing and walking about ; he was footsore and the rash appeared first on his feet. Other spots came out later, on his feet, on his hands, and face, and elsewhere ; he passed through a mild attack.

Curschmann did not get beyond preliminary speculation, but pointed out that further observation might clear up the principal points. This was done by Dr. Ricketts.

He considered exceptional instances like those quoted; such as were marked by a clustering of the rash at the site of vaccination, or around a mustard plaster put on for the pain in the back. He passed to consider other not uncommon sites of irritation, such, for instance, as the knee, where a ring of pocks has marked the places where the garters have chafed; or the shoulders, which may show similar but less well marked signs of the friction of braces. He came to see that the only factor common to these various sites was the disturbance of the cutaneous circulation due to an irritation which preceded the appearance of the rash. He formed the hypothesis that such circulatory disturbance was the factor determining the incidence of the rash. This was confirmed by the converse holding good, to some extent at least, namely, that a limb well splinted, for instance, showed less rash than a limb in ordinary use.

He argued that, if this hypothesis were correct,



it should hold good when applied to other phenomena of the rash. He found it did hold good, and that it applied to the trivial irritation of the skin in every-day life; and also to the protection which parts of it receive.

In order to understand this thesis fully, some actual cases should be examined in detail. Look at the foot. Look at the dorsum, and see how the prominent tendon is picked out by the rash, and how free from rash are the soft parts beneath the toes; notice the signs of chafing round the ankle; in some patients you may correctly infer that they wore shoes, the upper edges of which irritated the skin, and provided a favourable site for the rash.

Look at the knee joints and see which aspect is most marked with rash, the knees or the popliteal spaces; see whether the inner or outer aspect of the thighs is more thickly covered. Note again the remarkable difference between the front and back of the trunk, and reflect that the back is from its curve more exposed than the front, and does in fact receive constant friction from the clothes; note how the shoulders are marked by the rash, and how the axilla and flank are spared, being sheltered by the shoulder and arm. Then the

upper extremity; examine the fingers; count the spots on the backs of the fingers, and the spots between them, and compare the numbers. Count the spots on the forearm and those on the arm, compare them and consider whether the figures point accurately to the degree of irritation; examine whether the extensor or flexor aspect of the forearm is most thickly covered, and similarly examine the outer and inner surfaces of the arm.

Coming to the face, see how free from rash is the depression round the eye and how favoured the nose and the sides of it; and generally speaking how the rash picks out the hard and prominent parts and avoids those that are soft and sheltered. See how a sharp line marks off the exposed portion of the neck where it begins to be protected by the clothes. That brings us to an explanation of the hands and face being the normal sites of election. What parts are more exposed than they to irritation of wind and weather?

Such, shortly, is the thesis which Dr. Ricketts worked out, for fuller details of which his book\* should be consulted.

\* The "Diagnosis of Smallpox," by T. F. Ricketts, M.D. Illustrated from photographs by J. B. Byles, M.B. pp. 154. 122 Illustrations. Cassell & Co. 21s.

Nothing is so useful in diagnosis as the phenomena of the distribution of the rash. It should be understood, however, that the method requires practice, and should be used with discrimination. Special attention must be paid to the habits of the individual patient under consideration, and to the conditions to which the skin is exposed. Where, for instance, would you expect to find the greatest incidence of rash on an ill-kept infant? What differences in distribution and intensity would you expect to find between the rashes of a clerk and a sailor? What differences again between the winner of a London to Brighton walking race and an old bedridden woman?

PLATE I



SMALLPOX.



PLATE II



SMALLPOX.





PLATE III



SMALLPOX.



PLATE IV



SMALLPOX.



## CHAPTER VII

### OTHER FACTORS IN DIAGNOSIS

WE now come to some other characters of smallpox, which have a bearing on diagnosis. Dr. Ricketts has called attention to the dual nature of the disease; and the observation is just. He considers smallpox to be a two-fold disease, in this way. Smallpox proper is limited to the stage of invasion, and when the first period of fever is over, the attack proper is past. The so-called secondary fever, caused by the suppuration of the rash, is in the nature of an appendix to the attack, much in the same way that nervous phenomena may follow influenza, or bronchopneumonia may follow measles. It does not follow that in every case, once the fever proper is over, there is any rise of temperature at all. It may happen that the rash is too scanty, or that it rapidly aborts. I mention this, partly because

it meets a point of difficulty which is sometimes raised. "It couldn't have been smallpox," it is said, "the temperature was normal throughout." Very possibly, once the attack proper has passed off. Of course, an observed normal temperature throughout a supposed onset would negative smallpox; but in a mild attack the temperature may soon fall to normal, before the scanty rash has been observed, and so escape notice. Mild cases therefore require close observation. The following is an illustration.

A Salvation Army captain, who was stationed at the door of a Shelter during an epidemic, to observe men's faces, and to endeavour to keep out any cases of smallpox, was taken with a bad cold, with influenza, according to his own account, and soon felt nearly well again. "What you want now," his senior officer said to him, "is a day or two off duty, and a breath of fresh air to pull you together after your influenza, so away you go." He went off to a watering-place on the South Coast. During his stay there he went for a steamboat trip round the Isle of Wight, he said, and they had got round to the back of the Island, when he noticed he had a few spots on

his face. He returned that day and showed himself to the doctor. It was smallpox, and the man finished his holiday on the river, instead of at the sea. From the time of his going away on leave he was not at all ill, had no fever, ate and slept well. Mild cases of this kind are very apt to escape notice, principally from the patient becoming and remaining perfectly well when the initial fever has gone.

There is one characteristic feature of smallpox which may be of material assistance in diagnosis. In any well-marked attack there is a severe prostration accompanying the fever of the onset, and dominating the case before and when the rash is first making its appearance. Milder forms of smallpox resemble influenza in this respect. The patient is rendered prostrate. If he can keep to his work, the attack must be unusually mild or the patient unusually determined. Commonly he is confined to the house. He sits by the fire or keeps his bed. He tells you he is so weak in the knees that he cannot stand; his legs give way under him. He does not want to speak, move, or eat. He wants to be left alone. There is a marked relaxation of muscular tone. In the



index afforded by the delicate muscles of the face, the loss of tone is evidenced by a characteristic expression. It has been compared to that of a man who has had a hard run for a train, has just caught it, and sunk down exhausted into a seat. There is apt to be a similar facial expression of prostration and relaxation in the early stages of smallpox.

I have a note of the onset of smallpox in a girl of about three years of age, whom I saw not long ago. The rash was just appearing. The note runs : "the natural muscular tension is absent ; she looks exceedingly tired ; there is a pallor and a suggestion of ashy greyness in the face, and an expression, when her attention is roused for a moment, which is both appealing and hopeless." This child had a severe attack, and died.

I may illustrate this characteristic prostration in another way, namely, by showing the importance of its absence. I was asked to see a girl of twelve. She had a rash which was due either to smallpox or chickenpox. Whatever it was, it was very copious, being especially thick on hands and forearms and on legs and feet. It was one of the

most puzzling rashes that could be imagined. Neither the distribution nor the elements of the rash gave much help. But reliable evidence showed that she and her family had been to a fair on a Bank Holiday, and from it had walked home several miles, three I think, at the close of the day. On the next day the rash came out. The outing and long walk at the time of invasion were strong evidence against the attack being smallpox ; for the prostration which must have accompanied an attack of smallpox so severe as to produce such a copious rash, would have rendered impossible so much muscular exertion as had in fact been taken by the child. The diagnosis of chickenpox was made. Her sister who had been successfully vaccinated about a year previously, was infected by her, and had a similar attack of chickenpox.

One other matter may be mentioned in this place. It is useful to have in a handy form the dates of a moderately severe attack of smallpox, by way of having a typical case for reference. The different stages may be noted in this way. Suppose a man who has smallpox comes home from abroad on New Year's Day,

and on that day infects his brother. The brother's illness and rash will be dated as follows :

|                         |     |     |                         |
|-------------------------|-----|-----|-------------------------|
| Exposure to infection   | ... | ... | Jan. 1st.               |
| Onset of fever          | ... | ... | Jan. 13th.              |
| Rash papular—day 1 to 3 | ... | ... | Jan. 15th to Jan. 17th. |
| „ vesicular—day 3 to 5  | ... | ... | Jan. 17th to Jan. 19th. |
| „ pustular—day 5 to 9   | ... | ... | Jan. 19th to Jan. 23rd. |
| „ drying—day 9 to 17    | ... | ... | Jan. 23rd to Jan. 31st. |

Beyond this, it is necessary to allow a further period, before all the seeds can be removed from the palms and soles. Though smallpox presents extraordinary varieties of type and all degrees of severity, and though it may be difficult to fix upon an average case, it is nevertheless useful in practice to have some such case to refer to and work by, to use as a type to which other cases can be referred. The incubation period of smallpox is remarkably constant, twelve days being the general rule.

In the case taken as a type, it will be noted that two days are allotted to the papular stage, and two days to the vesicular; four days to the pustular, and eight days to the drying stage, the *stadium exsiccationis*. In practice, it is found convenient to speak of the stage of a case by the date of the rash. It is possible to make a close

and even accurate estimate of the day when the rash appeared, by observing the stage of the rash as it comes under observation. When patients conceal the true story, a not infrequent occurrence, the medical attendant may be able to form his own opinion of the day on which they actually fell ill. Such estimates are often most useful in tracing the history of an outbreak of the disease.

## CHAPTER VIII

### DIFFERENTIAL DIAGNOSIS

HAVING thus reviewed some of the more striking characters of smallpox itself, we pass to compare it with other diseases with which it has been confused, and to consider how it may be differentiated from them.

In the year 1902, 7842 was the total number of cases which were certified in London as smallpox and sent to the Receiving Stations. 607 of these cases were found not to be smallpox, and were classified as shown in the following list:—

| Number of cases.          |     |     | Number of cases.       |     |     |
|---------------------------|-----|-----|------------------------|-----|-----|
| 1. Chickenpox             | ... | 203 | Cases carried forward  | ... | 314 |
| 2. Measles                | ... | 48  | 14. Bronchitis         | ... | 2   |
| 3. Syphilis               | ... | 30  | 15. Uræmia...          | ... | 1   |
| 4. Scarlet Fever          | ... | 4   | 16. Appendicitis       | ... | 1   |
| 5. German Measles         | ... | 7   | 17. Pericarditis       | ... | 1   |
| 6. Influenza              | ... | 3   | 18. Bright's disease   | ... | 1   |
| 7. Typhoid Fever          | ... | 2   | 19. Pyæmia             | ... | 1   |
| 8. Pulmonary Tuberculosis | 2   |     | 20. Acute Mania        | ... | 1   |
| 9. Erysipelas             | ... | 3   | 21. Delirium tremens   | ... | 1   |
| 10. Meningitis            | ... | 2   | 22. Cerebral Tumour    | ... | 1   |
| 11. Pneumonia             | ... | 3   | 23. Traumatic Mastitis | ... | 1   |
| 12. Rheumatism            | ... | 2   | 24. Septicæmia         | ... | 1   |
| 13. Febris, unclassified  | ... | 5   | 25. Purpura            | ... | 2   |

| Number of cases.              |     |     |     |    | Number of cases.              |     |     |     |     |
|-------------------------------|-----|-----|-----|----|-------------------------------|-----|-----|-----|-----|
| Cases carried forward ... 328 |     |     |     |    | Cases carried forward ... 471 |     |     |     |     |
| 26. Acne                      | ... | ... | ... | 42 | 39. Lupus Erythematosus       | ... | ... | ... | 1   |
| 27. Erythema Rheumaticum      | ... | ... | ... | 13 | 40. Furunculosis              | ... | ... | ... | 2   |
| 28. Erythema Iris             | ... | ... | ... | 2  | 41. Dermatitis due to bites   | ... | ... | ... | ... |
| 29. Urticaria                 | ... | ... | ... | 12 | of insects                    | ... | ... | ... | 7   |
| 30. Eczema                    | ... | ... | ... | 31 | 42. Scabies                   | ... | ... | ... | 11  |
| 31. Impetigo                  | ... | ... | ... | 4  | 43. Whitlow                   | ... | ... | ... | 1   |
| 32. Lichen                    | ... | ... | ... | 26 | 44. Vaccination Rashes        | ... | ... | ... | 3   |
| 33. Herpes                    | ... | ... | ... | 4  | 45. Horsepox                  | ... | ... | ... | 1   |
| 34. Sycosis                   | ... | ... | ... | 1  | 46. Skin Diseases, unclassi-  | ... | ... | ... | ... |
| 35. Chloasma                  | ... | ... | ... | 1  | fied                          | ... | ... | ... | 74  |
| 36. Psoriasis                 | ... | ... | ... | 2  | 47 Lumbago                    | ... | ... | ... | 1   |
| 37. Drug Rashes               | ... | ... | ... | 3  | 48. No ascertainable disease  | ... | ... | ... | 35  |
| 38. Pemphigus                 | ... | ... | ... | 2  | Total                         | ... | ... | ... | 607 |

For the purpose of differential diagnosis, it is best to consider these various diseases in groups. Following the clinical course of smallpox, we will begin with those diseases which may simulate it before any rash appears at all; pass then to the stages of the initial rashes of early hæmorrhagic smallpox, and of the rash proper; in this way we shall see what diseases have been confused with the various stages of smallpox, and why. A number of points that bear on diagnosis will thus come naturally into view.

First of all, let us take rather a strange group, viz., lumbago, rheumatism, and appendicitis. Nothing that could be said about the pains of smallpox is so eloquent as this strange



list. It is not difficult to understand how lumbago may be thought to be smallpox, but rheumatism and appendicitis do not obviously resemble it. Pain in the back is a feature of smallpox, of which it is often difficult to appraise the value correctly. There are cases, of course, in which it is a sharply cut feature, as in the case of the little girl mentioned on page 58. With her it outweighed everything else. In reply to a question as to what was the matter, "Oh, it's my back!" she said in a pitiful low voice, and pointed there. The pain may be so excruciatingly severe as to require morphia. In other cases it is ill defined, varying in position and severity, and it may be even absent. It may be emphatically said that the statement "no pain in the back" does not exclude smallpox. Among the cases listed above which turned out not to be smallpox, "pain in the back" was present again and again; and it seemed to have been responsible for mis-diagnosis on a good many occasions. Especially was it apt to be valueless in women, as might be supposed, on account of its frequent association with uterine disorder. It is also apt to be of little value in those who admit chronic ill-health before

the rash could have supervened. In persons who "always suffer with my back" or "have been aching for the past week" it is very difficult to say where a chronic backache ends and one due to smallpox begins. In such cases pain in the back is best discarded from consideration. In a previously healthy child or man, on the other hand, it may be a clear and very striking feature. But it is always a subjective sign, and must be treated with the reserve which that class of evidence requires.

The belief that the pain due to smallpox seldom or never occurs in other parts of the body than the back is not at all in accordance with the facts. For instance, I recollect a case of acute illness being taken into a general hospital, and, on account of the character of the pains, considered to be acute rheumatism. The correct diagnosis, namely, smallpox, was made by observing the progress of the case and the appearance of the rash that supervened.

It may seem remarkable that what was really appendicitis should have simulated smallpox; the converse also occasionally happens. The confusion is due to the backache of smallpox radiating round

the trunk and manifesting itself in the front as well as in the back. It is important to realise this : otherwise it might be thought that abdominal pain excludes smallpox ; it does not.

Dr. A. F. Cameron, who has given close attention to this symptom as observed in 7000 cases of smallpox, wrote as follows in his Thesis on "The factors on which diagnosis in smallpox is based," Edinburgh, 1903. "The occurrence of pain in the back seems to have received a position of undue importance. Certainly severe lumbar or lumbosacral pain does not occur with the invariability on which so much stress is laid. Even in trustworthy patients presenting attacks of moderate severity, in which the lesions at full development may number between one and two hundred on the face, the backache may have been so slight that it is quite forgotten. The situation of this pain seems as variable as its severity. Often it is felt in the dorsal region. Many affirm that all the pain they suffered was in the neck and amounted to no more than a slight stiffness. On the other hand, some in whom the onset is exceedingly severe refer the pain entirely to the front of the body. Some

describe it as a sense of tightness or suffocation in the chest, others as severe abdominal pain which they mistake for colic. In the latter the flinching caused by superficial palpation and the aggravation of the pain on deep inspiration and sudden movement, seems to indicate that it is really referred to the abdominal wall, deep palpation producing no increase either in resistance or discomfort." The fact is that the initial pains of smallpox often have a wider distribution than is usually supposed; the localised back pain in the lumbar region is commonest, but in other parts pains are not uncommon, and must on no account be considered to be inconsistent with smallpox.

The next group of the above list comprises certain other acute diseases which are not usually marked by a rash. They are influenza, meningitis, pneumonia, pericarditis, and unclassified cases of "febris." The onset of smallpox often differs little from that of other acute diseases attended by fever, as for instance pneumonia. Lumbar pain, vomiting, and prostration may mark out some cases of smallpox; but often there is no distinguishing mark, and no certainty until the

rash appears; diagnosis may have to be left till then. Influenza claims a word. It is seldom mistaken for smallpox; but conversely, it fairly often happens that what is really smallpox is believed to be influenza. A diagnosis of "influenza with spots" is very suggestive of variola, and often requires further inquiry. In fact, an attack of smallpox of slight or even moderate degree may bear at first a very close resemblance to an attack of influenza. Especially are both marked by prostration; and the remarks on page 57 about that symptom are worthy of close attention.

Next we come to another group of rashless diseases, of a kind which seem to have not the remotest resemblance to smallpox. They are pulmonary tuberculosis, bronchitis, acute mania, cerebral tumour, mastitis, and thirty-six cases of no ascertainable disease. In all, the total number of cases listed here, and presenting no rash, is sixty-one. It is easy to explain how the majority of these came to a Receiving Station as smallpox. They were "long shots." I recall, for instance, the arrival of an ambulance omnibus which brought six patients fully dressed. Among them was one case of smallpox; a second developed the rash



of smallpox next day. The third had acute pneumonia; and the other three had nothing the matter with them. Other cases in this category were such as had some trifling disorder, children, for instance, who had eaten too many sweets, in whose house or street there had been cases of smallpox. Most of these patients were simply contacts, and no useful purpose was served by certifying them as smallpox and sending them to the Receiving Station. Little is usually gained by certifying a patient whose skin is perfectly clear, and the patient is apt to incur a good deal of annoyance and some risk. A rash should always be awaited. To postpone certification till the appearance of the rash is a good working rule.

In looking for an early rash, it is well to remember how slight it may appear. One is often struck with its insignificant and even benign appearance, when it first begins to show. I remember a woman, whose disease was really smallpox, and whose rash was exactly like that of enteric fever. It was composed of rose papules on the abdomen. They were soft and inconspicuous. The rash came first on the upper part of the abdomen, where there was pressure



and irritation from the clothes. After twelve hours or so, the eruption became general, and ran a normal course.

Even in a severe case, the early papular rash may have no disagreeable aspect at all. The face and other parts of the skin may be thickly marked with it without being much disfigured or rendered especially conspicuous. Patients themselves may think at first that, after all, smallpox is not so terrible as it was made out to be. They are comparatively easy after the abatement of the initial pain and malaise, and may even be really comfortable. At first the facial outlines and expression may be not greatly changed. But the rash develops inexorably. Nothing is more striking than the contrast between the appearance of a face on the first day of a severe rash and that on the octave. By that time each tiny, innocent-looking pink spot has gradually swelled to many times its original size, to a foul abscess, with which its crowding fellows have run together, so that the face is puffed up into a huge, coarse-looking mask, which is completely unrecognisable.

On what part of the skin ought we to search for the oncoming rash? The forehead and roots of

the hair should be well looked over ; any part of the face that is already sore is a favourite early site, such as the nostrils when chafed with coryza ; or the muco-cutaneous junction of the lips. The prominences of the cheek bones and the sides of the nose should be examined. No search is conclusive unless it is made in a good light. Attention should be given to the wrists, hands and forearms. A little observation and inquiry will show whether any particular part of the skin is specially irritated, such as the feet of a tramp, the groins of a baby, the site of recent vaccination, or any recent sore, scratch, or burn.

An important region is the buccal cavity, for the earliest indications of rash may be found here. A patient may draw attention to soreness of the throat or the feeling of spots inside the lips. A careful look at the pharynx may show superficial erosions into which the vesicles will have been macerated almost as soon as they were formed. Their appearance may not be sufficient to distinguish smallpox from chickenpox, but they will almost certainly indicate the presence of one of these two conditions.

## CHAPTER IX

### THE INITIAL RASHES

NEXT let us take two groups of diseases which may simulate the initial rashes of smallpox. In the one we have purpura of various kinds, and in the other measles, scarlet fever, r  theln, urticaria, and erythema. These two groups typify the two classes of smallpox initial rash, each of which has distinct characteristics. There should be no difficulty in getting a thorough grasp of them. The one class is petechial, persistent, and sinister; the other is erythematous, fugitive, and benign.

Let us first take the petechial. This class possesses a strong individuality among rashes generally. When once its acquaintance is made, it is easily recognised again. To begin with, it has a strong individuality in the matter of position; it always occurs in the groins; it may occur elsewhere, but always in the groins.

See the diagrams at the end of the chapter. It is sometimes called the bathing drawers rash, but that description is not accurate. It is essentially a rash of the flexures of the groin. If you ink the fold of the groin, and strongly flex the thigh on to the abdomen, the surface of the skin then stained gives a fair approximation of the usual distribution of this rash. It occupies just those parts of the skin which are in contact in full flexion. Inferiorly, it is sharply bounded by a line running across the thigh parallel to Poupart's ligament, between two and three fingers' breadth below it. On the surface of the abdomen it is less sharply defined; there it has a tendency to be lighter and more scattered; its margin is indefinite and spreads upwards towards the axilla. It nearly always occurs in both groins; and its extensions on the abdomen are apt to meet in front, and more rarely to pass round towards or to the small of the back. It often marks the axilla; leaving free the hairy part, indeed all the pit of the axilla, and marking out the anterior and posterior folds. It may lightly affect the back of the neck and of the knees. But it is especially a rash of the groins.

As to its quality and colour. At the time when it is usually first seen, that is, when attention has been drawn to it by the appearance of the papular rash, it is petechial and has a stippled appearance. By the second day of the true rash, the groin may look exactly as if it had been splashed or stippled with rusty orange and rusty red; sometimes these colours are remarkably vivid. From this time it gradually fades; but traces may persist until the fourth or fifth day of the rash proper.

If it should happen to be seen directly it appears, and that is usually on the second day of the illness, its appearance is different. Its distribution is the same; but it is then a dusky red, rather angry looking, uniform sheet of colour. Part of this can be discharged from the skin by pressure; part cannot be discharged, and is petechial. As Dr. A. F. Cameron has described it, this uniform sheet of colour resembles the close web of a fabric; the warp of which is erythematous, and the woof petechial; the erythematous warp disappears and leaves the fading petechiæ as above described.

One more point about it. It always has a



sinister import. It is usually associated with a severe type of attack. Not that such an attack is always fatal or even dangerous. But prostration is generally marked, and the initial attack—the attack proper—is apt to be severe.

So much then for the petechial initial rash; definite in locality, persistent in point of duration, striking in appearance, and associated with severity. It is pathognomonic. A diagnosis may safely be based on it.

In remarkable contrast to this is the other initial rash, the characters of which are easy to remember as being almost the exact opposites of what has been described. Here we have a transient, fugitive rash, passing in a few hours from one part of the skin to another; it is superficial and erythematous, and it nearly always marks a mild attack. This erythema, or blush, for often it is hardly more, may occur on the limbs, especially the extensor surfaces of the arms, and spread to the trunk; or may first show itself on the trunk and spread to the limbs. It is apt to pass quickly from one part to another, in the course of a few hours, and to occupy large patches and areas of skin, leaving other parts unaffected, and conspicuous

as pale islands of normal surface. It soon fades, and in the process may pass through a beautiful tint of colour, a somewhat dusky, delicate shade of pink ; the skin of the shoulder and flank and arm, for instance, looking as if it might have been covered by an excessively thin pink film from torn places in which the edges had receded and left islands of a natural skin, irregularly circular in outline. By this time the rash proper will have appeared, in the form of papules few and far between ; the remaining erythema is grouped around them ; it soon vanishes, and the papules are feeble and are apt to abort.

It is evident that this rash may be difficult to identify, and, of the two, is the less likely to be useful. But in some instances it may be invaluable for diagnosis. I recollect more than one case in which there had been a history of exposure to infection, and there was in due time a rise of temperature and onset of a very light diffuse erythema, and of superficial rapidly aborting papules, less than ten in number.

These then are the two types of initial rash, and it is well to fix them in the mind. They have variations. The most noteworthy are those



in which the initial and local petechiæ are but precursors of petechiæ which develop in many other situations and end in hæmorrhagic smallpox and death. Of the benign class of initial rash there are varieties in which the rash spreads to the face, and such a rash may be slightly but definitely raised. Occasionally patients present the appearance of having regular types of the two initial rashes at the same time in the same individual.

A word must be said about the difficulties presented by hæmorrhagic smallpox when accompanied by an initial erythema. In this virulent type of the disease there appears simultaneously with, or very soon after the onset (which is distinguished by its violence), an erythema which covers the whole body, involving the face as well as the trunk and extremities. The colour of this rash is usually brilliant at first. But as its brilliance fades to a purplish colour, the skin becomes studded with petechiæ. Soon the larger hæmorrhages make their appearance and by their size, their colour, and their number, stamp the case unmistakably as one of smallpox. Such cases occur, but happily are not common. One precaution may be suggested. If a case is met

with in which a violent onset of fever is accompanied or soon followed by the appearance of a generalised erythema, affecting the face and not showing very definite punctuation, smallpox must be carefully considered, and excluded, before the case is labelled as one of scarlet fever. The whole skin surface must be carefully scrutinised. The careful observer may be rewarded by the discovery of a few flat vesicular lesions, *i.e.* the true rash, widely scattered over trunk and extremities. The presence of such lesions with a dominant purpura forms not merely an additional ground of suspicion; it clinches the diagnosis of smallpox.

Generally speaking, as to the distinction between scarlet fever and smallpox, confusion can only occur in the absence of the papular rash of smallpox, and in the presence of the initial ones. It is very desirable therefore to study the account which has just been given of the initial rashes. When such rashes are present, there must be sought the other features of smallpox, a sharply oncoming fever of short duration marked by vomiting and prostration and pains. On the other hand, the well-known features of scarlet fever must

also be looked for; the punctate character of the rash, often seen to the best advantage on the flank and inner aspect of the thigh; the inflamed fauces; the characteristic tongue and glands.

Measles and rötheln come next to be considered. Measles is more fully spoken of on p. 93, where it is contrasted with the papular rash of smallpox. That is the kind of smallpox rash with which it is commonly confused. It is less often confused with an initial rash of smallpox. I do not recall having seen an initial rash of smallpox which bore a marked degree of resemblance to an ordinary measles rash. Any doubtful case should be studied in the light of what has been said about initial rashes to see if it conforms at all to smallpox; and then to see if it conforms at all to either measles or rötheln. The initial erythema of smallpox comes on the second day of illness, not on the face, or very rarely so, and is widely diffused in a few hours; measles appears on the face and is marked by a gradual spread over the whole surface of the body. Rötheln is marked by a lightness of symptoms, which is rare in smallpox. Both it

and measles are commonly distinguished, on the trunk, by an approximate evenness of pattern of the rash. In smallpox, the rash is symmetrical, in point of its general distribution on the trunk and limbs, but the spots on any given area are not so evenly distributed. But it may be that only the development or non-development of the rash proper of smallpox will settle the diagnosis: and such an issue may have to be awaited.

Urticaria may cause difficulty, but I recollect having seen only one initial variolous rash that was raised and was suggestive of urticaria.

Erythemata and drug rashes of various kinds are also to be considered. Injection of an anti-toxin serum may certainly produce a rash not at all unlike an initial erythema of smallpox; so may some food poisons; careful inquiry should be made whether any drugs or noxious articles of diet have been recently taken; self-prescribed sleeping draughts and powders, and patent medicines, such as the antipyretics, should also be kept in mind as possibilities.

Next we come to a difficult group of the rashes which simulate smallpox, namely, purpura of various forms, especially such as may be

associated with ulcerative endocarditis, meningitis, and septicæmia. A great number of smallpox cases present petechiæ at some time in their course. No severe attack of smallpox occurs without them. But what we have to think of here is purpura without any papular rash.

Bug bites, and especially flea bites, in a feverish subject may raise a suspicion of smallpox, which, in a dirty subject, is not at all unreasonable. But marks of this kind have an appearance characteristic of their origin, and soon tend to fade when the patient has been cleansed and freed of vermin. But a warning is desirable. Smallpox occurring among the dirty and neglectful may cause a patient's skin to present, side by side, both the hæmorrhages of smallpox and those due to insect bites as well; and there is a risk that the latter may be recognised aright, but the whole rash attributed to them. Some of the most puzzling rashes that occur are due to the super-vention of smallpox on previously existing skin disorder.

Anyone who is called to see a patient showing petechiæ, the cause of which is doubtful, should make a special point of asking himself the question



whether smallpox could produce them. If the disease is suspected, the flexures should especially be examined. Not a few cases of hæmorrhagic smallpox are but extensions, so to speak, of the petechial initial rash already described. Should a rash, however, exhibit petechiæ which have not this peculiar distribution, and yet suggest smallpox, every part of the skin must be carefully examined. In smallpox the conjunctivæ are marked sooner or later by hæmorrhages, blood-red in colour; the eyelids by extravasations which are bluish-black. The face, neck, shoulders, front and back of the trunk, and all the limbs must be carefully examined, special attention being paid to the flexures and to the points of pressure, and a general view should be taken of as much of the surface as can be seen at once. Hæmorrhages, if due to smallpox, usually vary in size, shape and colour. Evenness in these respects suggests some other disorder. In a case which I recently saw, for instance, hæmorrhages were numerous and smallpox had been feared, but the lesions were even in size, even and circular in outline, even in relative distance, and they were all of one variety. These points were against smallpox. That disease

was excluded in favour of ulcerative endocarditis ; and the diagnosis confirmed by the post-mortem examination.

Hæmorrhages in smallpox fall usually into one of three varieties. They may be red or reddish-purple petechiæ ; or they may be as dark as inkspots, as Dr. MacCombie describes them ; or they may have the appearance of bruises. The last-named will be found at points of pressure or handling, which in hæmorrhagic smallpox is very prone to produce hæmorrhages of this class. Careful examination must be made of the mucous tracts. The tongue and buccal cavity require close attention, and their examination gives an opportunity for testing the smell of the breath. In not a few hæmorrhagic cases it has a sickly and peculiar odour, otherwise indescribable, similar to that noticeable in some cases of hæmatemesis. Special inquiry should be made to ascertain if blood is escaping from any of the mucous orifices.

In connection with hæmorrhagic smallpox generally, one or two other points are worth attention. Not seldom the back pain is very severe, excruciatingly so, and that of itself may suggest this class of attack. Another feature



which may form a useful clue is the respiration. It is always quickened.

Not infrequently there is a low range of temperature, such as about  $101^{\circ}$  or  $100^{\circ}$ . The patient may be remarkably quiet; once the first pain is over there may be no apparent distress, no high temperature, no bounding pulse, apparently nothing fulminant. There may even be complete mental composure and even alertness. "Very chatty" is the bedside note on diagram IV. A patient may read his newspaper with interest, and discuss his plans for the future, all the while looking about him with the very stamp of death upon his face, and quite unconscious of it. But he is certain to die soon, and, it may be, very quietly and unexpectedly.

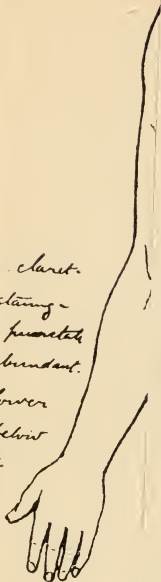
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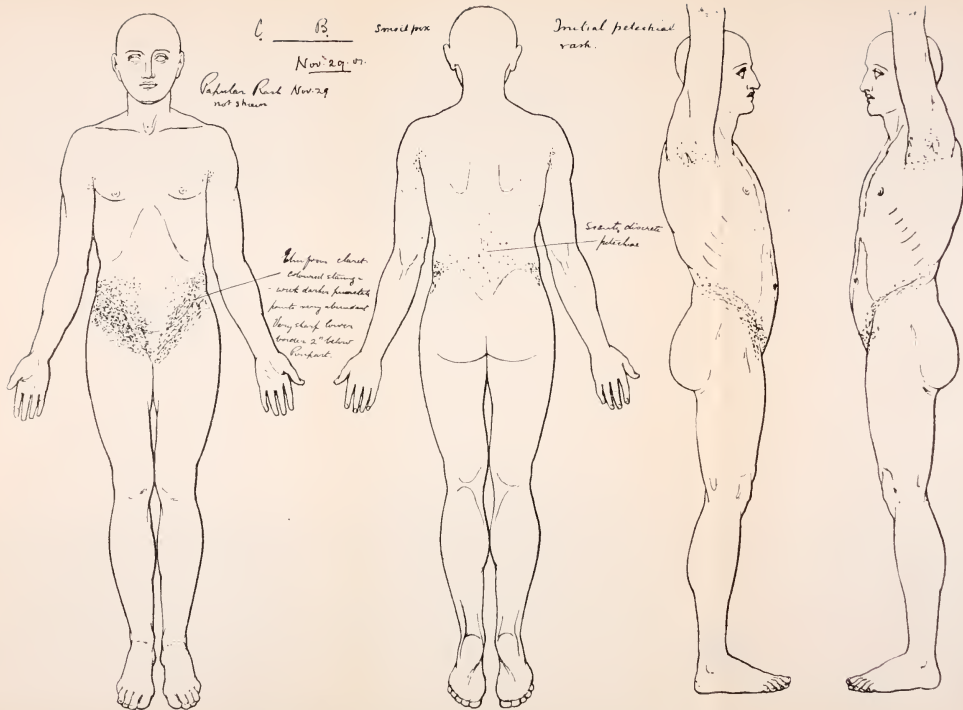
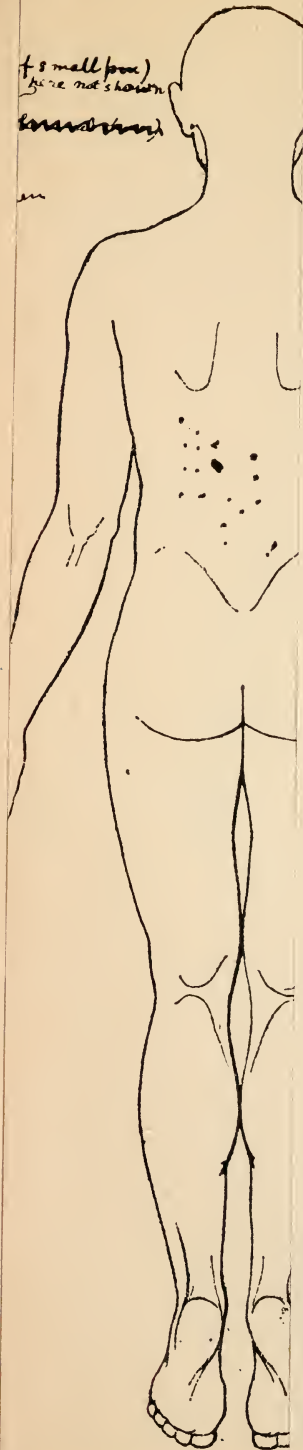


DIAGRAM I.—Petechial initial rash of smallpox dotted in on diagram, with bedside notes.

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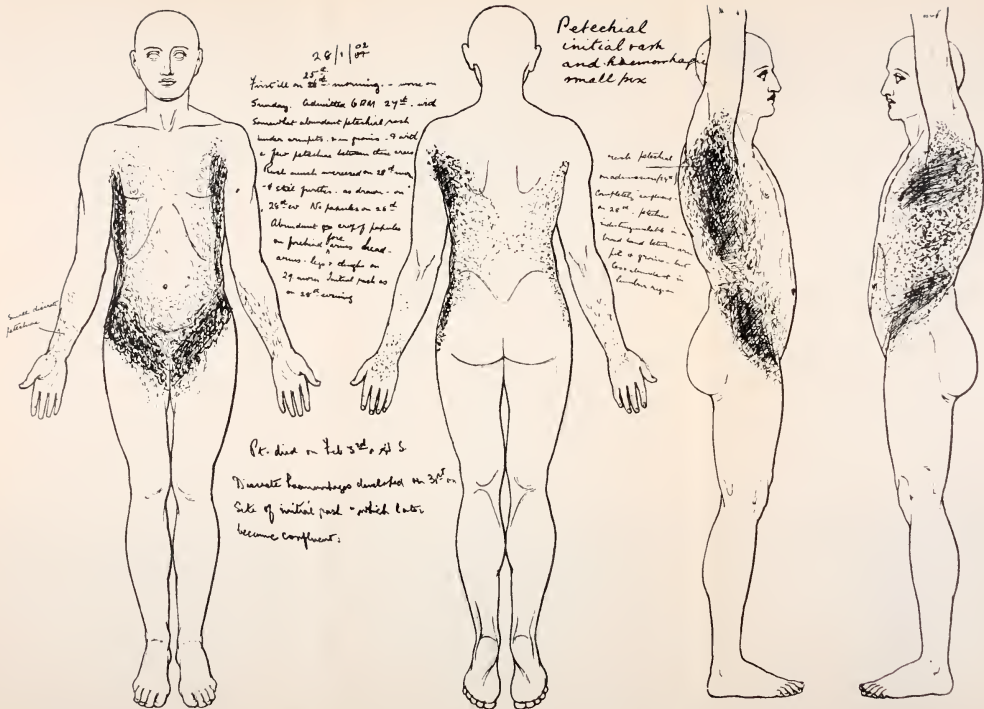
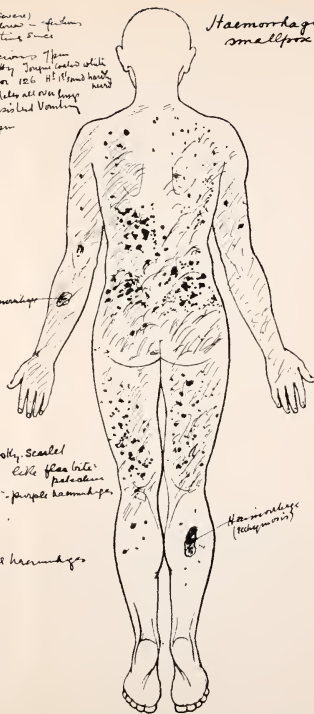
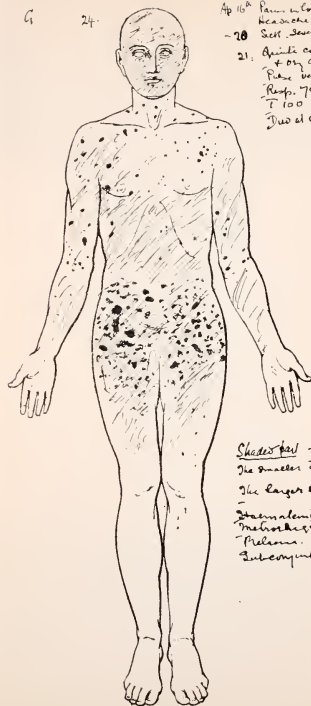


DIAGRAM III.—Petechial initial rash of smallpox dotted in on diagram, with bedside notes. Haemorrhagic smallpox supervened.



- Apr 16<sup>th</sup> Pains in loins (livers)  
Headache - fullness in infection  
- 70 Selt. Several times since  
21. Quite conscious 7pm  
+ very chilly Temp cooled while  
Pulse very poor 126 Ht 114 and hard  
Resp. 70. Rely all over lungs  
T 100. Persistent Vomiting  
Died at 4.10pm

*Haemorrhagic  
smallpox*



*haemorrhage*

Shades of - Dusky, Scalloped  
The smaller dots like flea bites  
pale skin  
The larger spots - purple haemorrhage.  
Haemorrhagic  
metrorrhagia  
Purpura  
Subconjunctival haemorrhages

*Haemorrhage  
(retro-orbitis)*



DIAGRAM IV.—Dusky erythema and haemorrhagic smallpox.

## CHAPTER X

### DIFFERENTIAL DIAGNOSIS OF CHICKENPOX AND OF MEASLES

OUR attention is now claimed by the differential diagnosis of diseases which are apt to be confused with the rash of smallpox in its papular stage or later; and first comes chickenpox. From the list on pp. 62-3, it is seen that, of the total 607, no less than 203, that is one-third, were chickenpox. This disease therefore requires special consideration.

In the differential diagnosis of smallpox and chickenpox it is usual to take the history first and then to examine the elements of the rash; and to leave the distribution to the last. The fallacies of histories have been pointed out on pp. 29 to 34; such an example of chickenpox diagnosed upon history, as is there given, is by no means uncommon. To get correct results, it

is necessary to take the rash first, and carefully to consider its distribution.

The distribution in chickenpox cases is striking, and significant. On the face the rash is well marked, and on the chest it is the same, and so it usually is on the back. But on the extremities it fades away from above downwards, till on the hands and feet there is hardly any at all. This gradual decrease in the rash, as one passes from the shoulders to the hand, is a strong characteristic of chickenpox; and, moreover, is in marked contrast to smallpox. Whenever a diagnosis is to be made between chickenpox and smallpox, it is a very practical step to have the patient stripped to the waist, and seated in a good light with the arms crossed in front, as in the man's photograph at the end of this chapter. Often this posture by itself will demonstrate the diagnosis without any further evidence. No opinion, however, should be given without a complete examination.

The distribution should be carefully observed, stress being laid upon the relative density of the rash. In the photograph of the man alluded to, the density of the rash on the chest, compared

with that of the rash on the face, is more compatible with chickenpox than smallpox ; that is to say it is too thick on the chest, relatively, for smallpox. And when the freedom from blemish of the arms and hands is considered with reference to the density on the chest and face, that relative distribution of the rash puts smallpox out of court. It is necessary to emphasize the word relative ; it is the proportion of the spots in one area to those in another that is all important.

The same comparison between the face, side, arm, and hand may be made in the case of the girl's photograph, resulting in the same diagnosis. That such a case is not smallpox may be perceived from the mere arrangement of the spots.

This much should be added, however, about the distribution of the chickenpox rash. Occasionally it also shows a tendency to favour sore or irritated surfaces. I have seen chickenpox rash pick out scratches and burns ; and, in infants' skins, surfaces irritated by rubbing. Only the tendency for chickenpox to favour these sites is very much less than in the case of smallpox.



Let us now take the individual lesions of the two diseases and compare them. Take the vesicular stage of smallpox. In the first place, many of the lesions are circular in outline; those that are not so, are but slightly out of the circular and some that at first sight looked elliptical, are seen on closer examination only to have that form from the fusion of two circular lesions. Nearly all the pocks are tense, and have a firm and definite outline; and finally, they are all definitely set *in* the skin and not *on* it. In order to appreciate the depth at which the lesion is set, roll a loose fold of skin between finger and thumb; a method which applies more especially when lesions are in the papular stage. It is, of course, an important point of differentiation, this degree of depth in the skin at which the lesions are situated. It is of no use to feel spots against a bony surface; when so felt, spots on the face are often shotty.

Now look at the characteristics of the chickenpox rash. Choose anywhere but the face if you can, for the purpose of examining the elements of the rash. The rash on the face, both of smallpox and chickenpox, is less easy to read

than on other parts of the body; so the face is best left till the last. Many cases occur in which the rash on the face is puzzling, but unmistakable in other regions. This is notably the case with chickenpox in adults. The rash of chickenpox on the face of an adult is apt to be coarse and obscured, and may resemble that of smallpox on the same region, much more closely than does a smallpox rash in the flank resemble chickenpox in this situation. Therefore, rather avoid the rash on the face, not in considering the distribution, of course, but in considering the elements of which the rash is composed.

Look now at the individual lesions of chickenpox on the trunk, in such a part as the small of the back, or the flank, or the neighbourhood of the umbilicus, or the anterior fold of the axilla, and see what the pock is like. Often it is not circular, but is elliptical, lozenge or spindle-shaped, the long axis lying in the same direction as do the natural folds of the skin on which the spot lies. That is a point worth bearing in mind. Next, the outline of the vesicle is not, as a rule, sharp and firm and well-defined, but is irregular and crenated. This goes with the general appearance

of the vesicle, which commonly does not look tumid and tense and bursting with pressure from within; often the pellicle is wrinkled and flaccid and even fallen in; so that a kind of spurious umbilication may be present. All these features of the chickenpox lesion are in association with, and are caused by, the superficial position of the spots in the skin. If a piece of the affected skin be lightly pinched up and rolled between the fingers, this superficial position will at once be evident.

Though these various characters are often of material assistance in distinguishing chickenpox, they may be insufficient for that purpose; for the elements of the one disease may resemble the elements of the other with marvellous closeness. Generally speaking, the resemblances between smallpox and chickenpox are very remarkable; so much so as to suggest they are descended from a common ancestor. In adults at least, both are marked by sudden onset, by fever and the symptoms commonly associated therewith; on the third day, a rash appears which runs a course from papule through vesicle, pustule, scab and scar. I recall three children of the same family

who were admitted together, and presented rashes which were very remarkable. All the attacks were mild and discreet. One of the patients might have been thought to have had both chickenpox and smallpox at one and the same time—a phenomenon which I have never seen. Another frankly had smallpox. But the third had a rash which was a marvellous counterfeit of chickenpox, in almost every particular. The pocks seemed superficial and were free from any surrounding redness; they were unilocular, translucent, pearly little blisters, a “window” of which was almost impossible to distinguish from chickenpox. The lapse of twenty-four hours, however, displayed the rash in its true character, deeper, more robust, redder, and angrier. It is in such cases that we are driven to consider what else there may be which may differentiate the major from the minor disease. Unilocation will not help us. Nor is it of much practical assistance that chickenpox may come out in crops. In any given window of the skin, chickenpox may show lesions in every variety of stage, namely as papule, vesicle, pustule, scab. This is in part due to the difference in size of individual lesions. The small ones run a shorter

course than the larger; and this partly accounts for the irregularity of the rash. A similar phenomenon is often seen in smallpox, though not to so marked a degree. No one should think of smallpox as a rash composed of elements of perfectly even size. That is seldom the case. Nor again are the spots evenly or regularly dotted about as if each were the centre of many regular squares or circles—that is never so.

It is sometimes suggested that if lesions appear upon the mucous membranes of the mouth, that fact excludes chickenpox. But the rash of chickenpox appears in those situations too. Nor is there any difference between the two diseases, so far as I am aware, in their relative incidence on the hard and soft palates, as has sometimes been alleged. A heavy incidence of rash on hands and feet is, by itself, an argument against chickenpox, but it requires to be supported by other evidence: I have seen not a few cases of chickenpox in which there was abundant rash on the extremities.

The conclusion is that there is no single touchstone for the differentiation of smallpox and



chickenpox. Stress has already been laid on the preference of the rash of smallpox for irritated and exposed surfaces, and no doubt that is the most useful single point of difference between it and many other diseases, chickenpox included. But it is imperative to take the whole of the evidence and weigh it together.

Passing now to measles, which comes next on the list, we find that clinicians who have seen little smallpox are apt to think they are not likely to confuse smallpox with measles; and I think they are right. It is those who are fairly conversant with smallpox who are more likely to be mistaken. That is one of the subtleties of smallpox. It by no means follows that an observer who has seen some hundreds of cases for diagnosis, and has got a good grasp of the subject,—it by no means follows that he will have no further difficulties or pitfalls to avoid. On the contrary, traps will be provided for him at every stage of proficiency; and measles is more apt to puzzle the skilled than the inexperienced.

Let me give an illustration. I was with a practitioner who had recently left a smallpox



hospital and entered general practice; he repeatedly called my attention to the close resemblance between some cases of measles we saw together and the smallpox cases with which he had previously been familiar. He repeatedly remarked how alike they looked at the first glance. It is in fact the case. Measles, when full out on the face, may bear an extraordinarily close resemblance to a smart attack of smallpox about the second day of the rash. I saw such a case recently. The patient was an adult; when I went into the room and saw the face thickly covered with rash looking at me over the top of the sheets, smallpox involuntarily came into mind. At the first glance one could hardly doubt the rash was due to smallpox, and the apprehensions of my colleague with whom I was in consultation, seemed fully justified. Not only was the rash plainly raised to sight and touch, but in the circumoral region, especially at the right side of the lower lip, it felt tough and firm, and was slightly but plainly vesicular. Moreover the history was consistent. There was a two days' history of fever and its usual accompaniments; there had been pains, and there was prostration.

The patient looked and was most seriously ill. But the temperature was  $105^{\circ}$ ; and that was a point against smallpox at the end of the papular stage. More important, however, was the distribution of the rash. I would repeat the warning, given on p. 89, to beware of paying too much attention to the elements of a rash on the face. I had the patient undressed to the waist. On an inspection of the trunk, the true nature of the rash became at once evident. If one had seen it first on the pectoral region or on the back, and had not seen the face, one could not have doubted, for a moment, that it was due to measles. Its density on the chest, the peculiar outline of its elements, the comparative regularity of its pattern, the absence of any definite papules—this with other points about its distribution generally, excluded smallpox, and settled the diagnosis of measles. I had an opportunity of seeing the case again at the end of twenty-four hours; by that time the rash had almost left the face. The skin was almost normal. Far otherwise would it have been in a case of smallpox; a rash due to that disease, however soft and velvety it might have been even on the second

day, would have become so aggressive and determined and enlarged, at the end of twenty-four or forty-eight hours, as to be impossible of mistake.

PLATE V



*Photo by Dr. J. Howell Griffiths.]*

CHICKENPOX.



PLATE VI



*Photo by Dr. J. Howell Griffiths.]*

CHICKENPOX.





## CHAPTER XI

### ADDITIONAL POINTS

GENERALLY speaking, when smallpox is suspected, the most useful plan is to ask the question of yourself, Can smallpox produce this? Then examine the various areas in turn from the point of view of distribution, and proceed to examine the elements of which the rash is composed.

In this connection I may draw attention again to a point mentioned on page 28. It is that a well marked rash cannot be due to smallpox, if the skin of a whole limb or other extensive area be entirely free of rash. Take, for instance, the rashes mentioned in the above list as due to bites of insects. Several of these were due to bug bites. The favourite seat was the neck, with some extension on to the shoulder and back; but the rest of the skin of the body was perfectly clear; and that absolutely excluded smallpox. In this

same class were several cases due to mosquito bites. Two of these patients were English persons who had been badly mosquito-bitten in Holland. The forearm, wrist, and hand of one of them bore a remarkable resemblance to those of a patient attacked by smallpox; indeed, the rash was almost indistinguishable. Moreover, the face was similarly affected, the bites having been inflicted while the patients were asleep in bed. Now here were two patients whose rashes were conspicuous on the hands and face, and regarded cursorily, had the closest resemblance to smallpox, and were certified to have that disease; but examination showed the rest of the skin to be absolutely free from any blemish whatever. That put the diagnosis of smallpox absolutely out of court. However much the local rash resembles smallpox, if it is at all copious and if it is strictly local, and the rest of the skin is clear, it cannot be smallpox. Smallpox is a generalised disease and exhibits something like a general symmetry in distribution.

There are one or two additional points which may usefully be mentioned.

It is well to know how to identify the latest

stage of smallpox, that is, after most of the scabs have disappeared. In inquiring into an outbreak it is not uncommon to receive a history of some one having fallen ill several weeks previously; and the suspicion of smallpox is raised. A complete and careful examination of the skin is required. Such an examination may establish an attack of smallpox, even where the rash has been light. A foot bath must be used if the feet are not perfectly clean; for on their condition the diagnosis may turn. On the face, what may appear at first sight to be large papules, are on careful examination seen to be nodules of scar tissue. Similar but less prominent lesions may be seen on the hands. If, in addition to these, pigmented recent scars are seen scattered about the trunk and other areas (and the tenderer the skin, as a rule, the flatter and softer the scar), and if on a general review the distribution corresponds with that of smallpox, then it may with confidence be said that smallpox could have caused these lesions. A very careful inspection should be made of the palms of the hands and soles of the feet and toes, for in these situations the scabs

are apt to remain longest. If in such situations, deeply situated brown scabs can be seen through the horny epidermis and partly masked by it, the diagnosis can be clinched. Only it should be remembered that scabs under the thick skin do not, of themselves, denote smallpox: occasionally chickenpox produces them. The distribution of the scars and scabs must be consistent with that of the rash of smallpox.

The assistance which may be gained, in obscure cases, from watching the progress and development of the rash should not be overlooked. There were sent for admission, for instance, a number of patients, several of whom had a chronic skin disorder; from some of them smallpox could be excluded, but of one other the skin was already so thickly covered by a chronic syphilide that no opinion at first was possible. There was nothing to be done but watch the case; in the event, hæmorrhagic smallpox supervened, but so thick was the chronic rash and so obscure the acute exanthem, that nothing but the lapse of time and the development of the rash could have rendered the diagnosis certain. The slow development, on the other hand, of such a rash

as is due to bromide or iodide of potassium may throw valuable light on its diagnosis.

Vaccination is a factor which occasionally may assist diagnosis. But it should not be considered until the end of the examination proper. Of course recent and successful vaccination completely excludes smallpox. But it may not be easy to say when vaccination is recent and successful. Mere scars may be of little value in this connection; and statements of patients that the operation was recent and successful are to be received with much caution. It is a sound administrative rule to regard no evidence of vaccination as satisfactory except the presence of a pigmented foveated scar. Even this may be misleading, if revaccination has been unsuccessfully performed on an old scar.

A matter which should always be in the mind of the diagnostician is the environment and condition of the patient's skin, as well as its texture; it is the fineness and delicacy of the skin of children, for instance, that makes a smallpox rash occasionally appear in them to be so superficial. In like manner the rash which comes on the flaccid, inelastic, thin and partly atrophied skin of an



infirmity bedridden patient has a character all its own.

In conclusion my advice is this. Have the possibility of smallpox always in mind. Have the greatest possible respect for it. Use every care in examining a case. Examine the whole skin, and see it in good light ; do not be satisfied until you have so seen it. Consider the distribution closely, and, if necessary, map it out on paper. Examine in what degree the rash is superficial or not. Consider the history last. Weigh all the evidence taken altogether, assigning the most importance to that afforded by the distribution of the rash.

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THE END



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